

Auroras were observed at Le Roy, New York, on the 20th; Winnipeg, Manitoba, on the 22d, 23d, 24th, 27th, 28th; Fort Bridger, Wyoming, 24th; Saint Vincent, Minnesota, 28th; Salina, Kansas, 30th.

THUNDER-STORMS.

Thunder-storms occurred in several states and territories during November as follows:

Arizona.—Fort Bowie, 9th; Fort Apache, 8th and 9th; Prescott and Fort McDowell, 8th.

Arkansas.—Fort Smith, 3d, 17th, 22d; Lead Hill, 3d, 22d.

Dakota.—Huron, 15th.

District of Columbia.—Washington City, 23d.

Florida.—Jacksonville, 19th, 27th, Key West, 3d, 4th, 5th, 7th, 13th, 18th, 19th, 20th, 28th; Sanford, 19th, 28th; Cedar Keys, 28th; Pensacola, 3d, 22d; Archer, 3d, 4th, 19th, 20th, 27th, 28th; Limona, 3d.

Georgia.—Savannah, 4th; Forsyth, 18th.

Illinois.—Chicago, 16th; Mattoon, 1st; Sycamore, 16th; Sandwich, 17th.

Indiana.—Logansport, Wabash and Fort Wyne, 16th.

Kansas.—Independence, 2d, 18th; Wellington, 15th; Maud, 3d, 15th.

Louisiana.—New Orleans, 22d; Grand Coteau, 13th, 22d.

Maryland.—Baltimore and Fallston, 23d.

Minnesota.—Chester, 1st.

Mississippi.—Vicksburg, 22d.

New Jersey.—Vineland and Moorestown, 23d.

New York.—Palermo, 4th.

North Carolina.—New River Inlet, 19th; Smithville, 23d; Hatteras, 13th, 16th; Kitty Hawk, 24th.

Pennsylvania.—Blooming Grove, Catawissa, and Dyberry, 23d.

South Carolina.—Aiken and Stateburg, 23d.

Tennessee.—Austin, 23d; Memphis, sheet lightning in the west at midnight of the 3-4th.

Texas.—Galveston, 11th, 12th, 17th, 22d, 27th; Indianola, 2d, 11th, 12th, 17th, 21st, 22d, 25th, 26th; Palestine, 11th, 17th, 21st, 25th; Brownsville, 1st, 11th, 12th, 17th, 22d; Fort Stockton, 21st, 22d, 27th; Fort Concho, 3d, 4th, 11th, 12th, 17th; El Paso, 9th, 10th; New Ulm, 11th, 12th, 17th, 22d; Cleburne, 3d, 17th, 22d.

Virginia.—Chincoteague, Fort Myer, Lynchburg, and Variety Mills, 23d.

West Virginia.—Helvetia, 23d.

Wisconsin.—La Crosse, 1st; Beloit and Sussex, 16th.

Wyoming.—Fort Bridger, 16th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos were observed in the various districts as follows:

New England.—13th, 16th, 17th, 18th, 25th, 27th, 29th.

Middle Atlantic states.—3d, 8th, 16th, 17th, 27th, 30th.

South Atlantic states.—3d, 5th, 18th, 22d, 23d.

Florida peninsula.—13th, 17th, 29th.

East Gulf states.—19th, 26th.

West Gulf states.—Little Rock, Arkansas, 11th.

Rio Grande valley.—21st, 24th, 25th, 27th.

Tennessee.—11th, 17th, 21st, 22d, 25th, 26th, 27th.

Ohio valley.—Sunman, Indiana, 22d.

Lower lake region.—1st, 3d, 22d.

Upper lake region.—3d, 7th, 13th, 15th, 19th.

Extreme northwest.—6th, 10th, 16th, 18th, 21st, 30th.

Upper Mississippi valley.—3d, 18th, 19th, 23d, 24th, 29th, 30th.

Missouri valley.—Vermilion, Dakota, 22d.

Middle slope.—14th, 16th, 20th, 23d, 26th.

Southern plateau.—El Paso, Texas, 12th, 13th.

Middle plateau.—2d, 3d, 6th, 9th, 13th, 14th, 15th.

Northern plateau.—3d, 20th, 22d, 27th.

North Pacific coast region.—Roseburg, Oregon, 12th.

Middle Pacific coast region.—1st to 4th, 6th, 8th, 10th, 11th, 14th, 17th, 18th, 19th.

LUNAR HALOS.

Lunar halos were observed in the various districts, as follows:

New England.—1st, 2d, 3d, 22d, 25th, 27th, 29th, 30th.

Middle Atlantic states.—1st to 4th, 16th, 18th, 21st, 24th to 27th, 30th.

South Atlantic states.—1st to 4th, 24th, 25th, 27th, 28th, 29th.

Florida peninsula.—27th, 29th, 30th.

Eastern Gulf states.—1st, 5th, 30th.

Western Gulf states.—1st to 4th, 23d, 25th, 26th, 28th.

Rio Grande valley.—24th, 27th.

Tennessee.—25th, 26th, 29th.

Ohio valley.—1st, 2d, 21st, 22d, 25th, 26th, 27th, 29th, 30th.

Lower lake region.—1st, 3d, 21st, 23d, 27th, 30th.

Upper lake region.—1st, 2d, 4th, 7th, 26th to 30th.

Extreme northwest.—1st, 8th, 11th, 24th, 27th, 28th, 29th.

Upper Mississippi valley.—1st, 2d, 20th, 24th, 26th, 27th, 28th, 30th.

Missouri valley.—1st, 2d, 22d, 25th, 27th, 28th.

Northern slope.—2d, 5th, 28th, 30th.

Middle slope.—2d, 24th, 25th.

Southern plateau.—3d, 25th, 26th, 28th.

Middle plateau.—1st, 2d, 6th, 8th, 23d, 28th.

Northern plateau.—7th, 23d, 27th.

North Pacific coast region.—1st, 4th, 6th, 7th, 23d, 25th, 27th.

Middle Pacific coast region.—1st, 4th, 6th, 7th, 23d, 25th, 27th.

The phases of the moon during the month were: full moon, 3d, 3.30 a. m.; last quarter, 9th, 6.06 p. m.; new moon, 17th, 1.05 p. m.; first quarter, 25th, 5.09 p. m., perigee, 4th, 11 a. m.; apogee, 19th, 9 p. m.

MIRAGE.

Allison, Decatur county, Kansas: a remarkable mirage was observed at Kenneth, in the adjoining county (Sheridan), on the 18th. It appeared a short time after sunrise, showing plainly portions of the country ordinarily beyond the range of vision. The divide north of the North Solomon river, fifteen miles distant, was plainly visible. The bluffs south of Hackberry Creek and also those south of Smoky Hill river, from twenty-five to fifty miles distant, were plainly discernible, and appeared as though suspended in the sky.

Bismarck, Dakota: on the morning of the 13th Fort Yates and Standing Rock, situated sixty-five miles south of Bismarck, were plainly visible. The surroundings of these places, which are separated from Bismarck by a range of high hills, were brought fully into view. The mirage was first observed at 7 a. m., and continued until 8.30.

Webster, Day county, Dakota: mirage was observed on the 5th, 7th, 12th, and 13th; that on the last-named date being especially beautiful. The town of Bristol, and a railway train moving eastward, were plainly visible. Bristol is eleven miles west of Webster. The limit of vision was greatly extended in all directions; and to the southward houses appeared in inverted positions.

New London, Connecticut: a well-marked mirage was visible during the afternoon of the 3d, points of land below the horizon being visible 15° above the sea line.

Galveston, Texas: on the 30th, at 3 p. m., a very perfect mirage was observed. Bolivar City, over five miles distant, appeared so near that the doors and windows of the houses were plainly visible.

Northport, Michigan, 20th: a mirage was observed at 1.45 p. m. in the east, and continued until 2.25.

Mirage was also observed at the following stations:

Salina, Kansas, 7th, 14th.

Genoa, Nebraska, 8th, 10th, 11th.

Indianola, Texas, 18th, 19th, 23d.

The following extract is from the "Los Angeles (California) Herald," of October 23d, 1884:

Just before the rain of Sunday, October 12th, when the clouds hung low on the Sierra Madre, and the air was heavily charged with vapor, there was a rare sight in Crescent, Canada. The Sierras were hidden from view, and

the upper side of La Canada, by the reflection of the light, seemed lifted up about six thousand feet, occupying the topmost height of the mountains. The ranch of Colonel T. S. Hall was most conspicuously exalted. His eucalyptus trees appeared to be in the very skies, while his neighbors along the upper mesa were also elevated to a strange, weird and fantastic height. The spectacle continued for nearly two hours, when it slowly faded away, and the landscape settled down again apparently about six thousand feet to its normal condition. The sight was rare, and of absorbing interest to all who beheld it. It is not often that the refraction of light is so intense in its manifestation as in this case, and the occasion is deserving of more than a passing notice. In a horizontal distance of two and one half miles, there was a manifested elevation of more than a mile. To one familiar with the features of the country the sight was especially interesting.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from one hundred and sixty-two stations show 4,828 observations to have been made, of which one was reported doubtful; of the remainder, 4,827, there were 4,317, or 89.4 per cent., followed by the expected weather.

SUN SPOTS.

Professor David P. Todd, director of the Lawrence Observatory, Amherst, Massachusetts, furnishes the following record of sun spots for November, 1884:

Date— Nov., 1884.	No. of new		Disappeared by solar rotation.		Reappeared by solar rotation.		Total No. visible.		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
3, 2 p. m.							1	5	
3, 4 p. m.	0	0	0	0	0	0	1	5	
5, 10 a. m.	0	0	0	0	0	0	1	2	
6, 9 a. m.	0	0	0	0	0	0	1	1	
7, 2 p. m.	0	0	1	1	0	0	0	0	
8, 9 a. m.	0	0	0	0	0	0	0	0	
9, 1 p. m.	1	5	0	0	0	0	1	5	
9, 4 p. m.	1	1	0	0	0	0	2	6	
10, 1 p. m.	2	15†	0	0	0	0	4	20†	
12, 4 p. m.	3	5†	1	2			0	25†	Spots mostly small.
13, 9 a. m.	0	0	0	0	0	0	6	25†	Do.
14, 3 p. m.	0	0	0	0	0	0	5	25†	Do.
18, 1 p. m.	0	0					2	5	
21, 11 a. m.	2	30†					3	35†	
22, 10 a. m.	0	0	0	0	0	0	3	35†	
24, 10 a. m.	0	0	0	0	0	0	3	25†	
25, 9 a. m.	2	5	0	5†	1	2	5	25†	
27, 1 p. m.							2	20†	
29, 3 p. m.	1	5†	0	0	0	0	3	25†	
30, 10 a. m.	0	0	0	0	0	0	3	25†	

Faculae were seen at the time of every observation. †Approximated.

Mr. William Dawson, at Spiceland, Henry county, Indiana, reports sun spots as follows:

Date.	No. of groups.	No. of spots.	Remarks.
1884.			
November 6	1	1	Near west edge.
7	1	1	1' from west edge.
8	0	0	
9—9 a. m.	2	10	Nine spots near centre.
9—2.30 p. m.	3	25	Spots increasing rapidly.
10	4	33	
11	7	47	
12	6	40	
13	7	43	
14	5	50	
15	6	28	
16	6	10	
19	3	28	
21	4	61	Five spots quite large.

NOTE.—Telescope, 4.6 inches aperture; power, 100; prism eyepiece; full aperture used.

SUN GLOWS.

The following communication referring to the first appearance of these phenomena in November, 1883, has been received from Mr. Willard D. Johnson of the United States Geological Survey:

WASHINGTON, D. C., December 9, 1884.

Prof. CLEVELAND ABBE, U. S. Signal Service, Washington, D. C.

DEAR SIR: The phenomena of the red skies first attracted my attention

on November 24, 1883, near Mono Lake, California. A heavy wind had been blowing across the Sierras from the west since the previous evening; as the air was apparently clear the day seemed unaccountably gray and the fiery sunset, and widespread, persistent after-glow excited comment in my party as a remarkable and impressive exhibition. Sunrise on the following morning was preceded by a yet deeper and higher-reaching color in which a shade of green was prominent. The appearance of this sky was peculiarly unnatural, my cook describing it as "sickly," and declaring that it destroyed his appetite. During the day, although the sky remained cloudless, the sun's light was very sensibly diminished; its disk variously tinted with alternating shades of red, yellow and green, and its outline traceable to the naked eye.

For a week at least, the striking exhibitions showed no abatement. When we finally learned that they were not of local occurrence, and were of general interest, we could not remember that we had observed any unusual appearance of the skies previous to the above date.

Very respectfully,

WILLARD D. JOHNSON.

The sun glows were as extensively observed during November, 1884, as in the preceding months, being reported generally from all parts of the country. The displays equalled in brilliancy those heretofore observed, and in some instances are said to have surpassed those of last year.

Mr. C. Beecher, voluntary observer at Newport, Florida, reported: "on the 18th and 25th a brilliant red sky before sunrise—more splendid than anything last year—it seemed as though an immense conflagration were raging. It extended half way around the horizon and was reflected on the opposite side."

DROUGHT.

Alabama.—Professor P. H. Mell, jr., director of the Alabama State Weather Service, reports the following:

The autumn of 1884 was remarkable for the longest and most severe drought ever recorded by the meteorologists of the state. Beginning immediately after the violent rains of the last week in July, it continued through August, September, October and November, broken only by a few showers. The drought was aggravated by the unusually high temperature of September and the first week of October. This combination of heat and drought reduced the streams, wells and springs, and reports of the dearth of water came from all quarters of the state, except along the coast, where the precipitation was nearly normal. In many sections cattle were fed as in the winter; pastures and all late crops were much injured; the sowing of grain was greatly retarded; the amount of cotton made was reduced, but most of the crop was gathered before any rain fell upon it, and it is in excellent condition for the market.

Florida.—Cedar Keys, 3d: the weather continues very dry; cisterns exhausted and water for drinking and household purposes very scarce; 13th, drought still continues.

New Hampshire.—The "New York Herald" of November 20th published the following:

CONTOOCOOK, November 19.—The effects of the drought are seriously felt in many portions of this state. In some localities sickness, due wholly or in part to the use of water from low wells, has occurred and seems to be increasing.

The following is from the "New York Journal of Commerce," of November 24th:

NASHUA, November 22.—The drought has become a very serious matter in this vicinity and is a cause of general alarm in its consequences upon the health of the people. In many of the suburban towns wells and springs have given out, farmers have to drive their live-stock long distances for water, and are also greatly troubled in obtaining water for household purposes. In this city the sewerage is affected, and the scarlet fever, from which there has been a great many deaths, is raging to such an extent that at a meeting of the Board of Education last night it was voted to close the public schools.

New Jersey.—Vineland, Cumberland county, 30th: the weather continued very dry during the month; wells very low.

North Carolina.—Kelley's (near Raleigh), 30th: the severest drought that has been experienced for many years prevailed from September 11th to November 19th; the streams and wells became nearly dry.

Tennessee.—Nashville, 26th: drought prevails throughout the state; since the 1st only 0.88 inch of rain has fallen.

Virginia.—Wytheville: the long continued drought was ended by the rains of the 23d.